

Theory, Implementation, and the Future of Airpower*

Prof. Mark Clodfelter

Since the dawn of civilization, people have tried to predict the future of war. Twenty-four hundred years ago, Thucydides addressed many enduring aspects of conflict in his great *History of the Peloponnesian War*, noting that “fear . . . honor and interest” will always motivate humans to fight. At the same time, the Chinese military philosopher Sun Tzu also expressed his thoughts on war’s constant attributes, highlighting deception and the indirect approach as the best means for success.¹ Of course, no discussion of military theory would be complete without mentioning Carl von Clausewitz, whose “trinity” serves as a foundation for forecasting how the various elements of war’s nature may relate to one another in a specific conflict.² Clausewitz also tried to decipher the constantly changing elements of war that comprise its character, emphasizing the degree of social involvement and downplaying the role of technological advances.

For the great airpower theorists, technological change was the essence of their ideas about the future of war. To individuals like Giulio Douhet, Hugh Trenchard, Billy Mitchell, and John Warden, aircraft have revolutionized warfare, and the theories that they developed detail how conflict will differ from its previous forms. Without a doubt, the continuing development of airpower will affect *how* future war is waged. Airpower has become part of what Clausewitz called the “grammar” of war—an element that has its own unique characteristics. Yet,

*This article was originally presented at the 2014 International Symposium on Air Warfare hosted by the Turkish Air War College, Istanbul, Turkey, 12 March 2014.

Disclaimer: The views and opinions expressed or implied in the *Journal* are those of the authors and should not be construed as carrying the official sanction of the Department of Defense, Air Force, Air Education and Training Command, Air University, or other agencies or departments of the US government. This article may be reproduced in whole or in part without permission. If it is reproduced, the *Air and Space Power Journal* requests a courtesy line.

Report Documentation Page			Form Approved OMB No. 0704-0188	
<p>Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p>				
1. REPORT DATE OCT 2014	2. REPORT TYPE	3. DATES COVERED 00-00-2014 to 00-00-2014		
4. TITLE AND SUBTITLE Theory, Implementation, and the Future of Airpower			5a. CONTRACT NUMBER	
			5b. GRANT NUMBER	
			5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)			5d. PROJECT NUMBER	
			5e. TASK NUMBER	
			5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Air Force Research Institute (AFRI),Air and Space Power Journal,155 N. Twining Street,Maxwell AFB,AL,36112-6026			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSOR/MONITOR'S ACRONYM(S)	
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited				
13. SUPPLEMENTARY NOTES				
14. ABSTRACT				
15. SUBJECT TERMS				
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 10
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified	19a. NAME OF RESPONSIBLE PERSON	

whether its use in the years ahead plays out according to the theories' predictions depends upon many factors: *why* people use airpower—that is, the desired political and military objectives they ask it to achieve; the *perceptions* of those who apply airpower, of those on the receiving end of its application, and of those on the rest of the planet; the *type of conflict* in which it participates; and the *capabilities* that it possesses, which stem from the funding it has received. Of those factors, the first is by far the most important—the objective sought by a political leader who uses airpower to help attain it. Clausewitz observed that war's "grammar, indeed, may be its own, but not its logic."³ When applied, airpower will behave according to the laws of physics and mathematics, but the rationale—the logic—for using it comes from the desired political goals.

Before examining the factors likely to affect future airpower, one would do well to define the term. Billy Mitchell's definition—"the ability to do something in the air"—allows considerable leeway.⁴ His characterization could include a bullet, an artillery shell, a flock of geese, or even Kobe Bryant's three-point jump shot. A better definition comes from British air marshals M. J. Armitage and Tony Mason's book *Air Power in the Nuclear Age*: "the ability to project military force from a platform in the third dimension over the surface of the earth."⁵ Now, that definition is not perfect. Armitage and Mason debate whether missiles should be included, and they are squishy about space platforms—both would seemingly fit their terminology. Further, they make no mention of cyber—not surprising for a work published in 1983. The US Air Force embraces that capability in its most recent definition of airpower: "the ability to project military power or influence through the control and exploitation of air, space and cyberspace to achieve strategic, operational or tactical objectives."⁶ Even though cyber is such a different domain and could rightly be omitted from this definition, that fact does not detract from its importance. Cyber power will likely play an *enormous* role in future crises, but because of its unique characteristics and potential impacts, it should be thought of as a separate entity—one that will often complement airpower's effects.

Given cyber's distinctive nature, it would not be unusual if in the next few decades, many of the world's nations create separate "cyber services" that parallel the development of independent air forces during the last century. Accordingly, Armitage and Mason's definition suffices as a baseline for examining the factors likely to affect future airpower.

A key component of that definition is "the ability to project *military* force from a platform in the third dimension over the surface of the earth" (emphasis added). Although airpower can certainly be used for humanitarian relief and other nonlethal missions, its primary use is for *war*. As such, it will remain a political instrument employed to realize objectives sought by a nation-state or a nonstate actor. In the future, for a great power like the United States that will fight only limited wars, the political goals sought in those conflicts will always consist of two categories—"positive" and "negative," the former achievable only by applying military force and the latter only by limiting the amount of force used.⁷ One must attain *both* the positive *and* the negative objectives to gain the elusive goal of "victory" in those future limited conflicts. For many such clashes, the negative objective of "winning hearts and minds" will restrain the amount of force used, whether the hearts and minds to be won are in a confined combat arena such as Afghanistan or in an unbounded region like the "Muslim world." In many cases, such "target audiences" will be present in multiple locations, and the impact of 24/7 news coverage—supplemented by "reporting" on social media networks like Facebook and Twitter—will make realization of the negative goal of favorable perceptions difficult indeed.

In future wars, *enemy leaders'* and civilians' perception of airpower's kinetic actions will be important determinants of whether a state—or nonstate actor—can use it in the pursuit of positive political goals. The perceptions of *allied or neutral* leaders and civilians regarding those kinetic actions will go far towards determining whether the actor can fulfill its negative objectives. For the United States, sophisticated manned and remotely piloted aerial platforms as well as smart munitions have significantly limited the amount of collateral damage from air strikes

and will likely make even more improvements in that regard. But in the final analysis, only the *perceptions* count. According to human-rights experts at Stanford's and New York University's law schools, the United States killed roughly 2,300 militants (only 2 percent of whom were "high level" targets) and 700 civilians (almost 200 of whom were children) in drone strikes in Pakistan from June 2004 to mid-September 2012.⁸ As a result, 74 percent of Pakistan's populace now considers America an enemy.⁹ Such a reaction would not surprise Clausewitz, who observed that the nature of war is enduring—a swirling mixture of emotion, chance, and rationality—and that emotion and chance will always combine to affect what is perceived as "rational." If killing 700 Pakistani civilians triggers more than 2,300 terrorist recruits, the United States will have a difficult time indeed reaching either its positive or negative objectives—not only in Pakistan but also in other limited wars against irregular opposition. Those who wield American airpower *must* be aware of such outcomes *before* committing it.

Of course, the *type* of war will matter greatly in terms of the application and effectiveness of airpower. Against enemies waging "conventional" war, the application may seem more straightforward, but positive and negative objectives will still be present. Even in the so-called good war against Iraq—the 42-day conflict of 1991—President George H. W. Bush faced the negative objective of preserving the coalition, a key factor that caused him to end the war without advancing to Baghdad. Yet, in such future conventional conflicts, airpower will dominate. As British military analyst and historian Colin Gray has noted, in "regular conventional warfare," the side with dominant airpower will usually win, and its air components will serve as the *supported* force while land and sea forces play a *supporting* role.¹⁰ Accordingly, most future American enemies will shun a conventional fight and opt to use their own asymmetric advantages in a mix of regular and unconventional techniques known as "hybrid war." Those approaches may well include "a poor man's air force"—Scuds, drones, rockets, or cruise missiles. In 2006 Hezbollah launched a cruise missile to attack an Israeli ship, and Hamas has used drones against Israel to such a degree that

the Israelis attacked a “drone factory” in Gaza in November 2012.¹¹ As of 2012, 75 countries besides the United States possessed drones, with more nations actively seeking them. Eight years earlier, only 41 nations had remotely piloted vehicles.¹²

Against enemies that wage hybrid war, airpower’s *nonkinetic* functions will likely play a role just as important as missions involving the dispensing of ordnance. The triumvirate of intelligence, surveillance, and reconnaissance (ISR) will prove essential in determining an enemy’s location and likely course of action. Remotely piloted aircraft probably will form a significant part of the ISR equation, and space surveillance will be a vital component. If the military needs ground forces quickly, airlift will remain the most rapid means of moving them to the crisis location—assuming the availability of nearby bases. Unfortunately, the need for bases will continue to restrain airpower, especially its airlift and remotely piloted reconnaissance missions. For the United States—the world’s only “global” airpower—such restrictions mean that aircraft carriers and amphibious assault ships will remain essential elements of its aerial arsenal in the years ahead.

Other factors will limit all nations’ future airpower capabilities, chief among them funding—a major concern in an era of fiscal uncertainty. With the possibility of sequestration again looming and the likelihood of additional military spending cuts, even if the services dodge 2014’s sequestration axe, a significant restructuring of America’s air forces is a distinct possibility. The US Air Force has begun purchasing far more remotely piloted than manned aircraft, and the prospect that it will buy 1,763 F-35s—which now have flyaway costs of roughly \$185 million each—is remote.¹³ Similarly, the Navy and Marine Corps are unlikely to purchase their projected complement of almost 700 fighters, which have price tags in excess of \$200 million each. According to some estimates, the Marines’ short takeoff and vertical landing variant—the F-35B—approaches \$300 million.¹⁴ If the costs of those aircraft are to stay at those estimated figures, not only must the US military purchase its full complement of aircraft but also F-35 partner countries

have to purchase 660—and foreign military sales to other nations must reach 750 platforms.¹⁵

Yet, the trend is not promising. The original F-35 program called for 409 more aircraft than currently planned, and the Pentagon's proposed budget for fiscal year 2015, publicized early this year, decreased the number of F-35s that it plans to purchase in the year ahead from 42 to 34.¹⁶ The Navy announced in March 2014 that "budgetary pressures" will cause the service to obtain only 36 F-35Cs during the next five years instead of the original 69 programmed.¹⁷ The F-35 program is already seven years behind schedule and \$163 billion over budget, causing its chief—Lt Gen Christopher Bogdan, USAF—to comment that "basically the program ran itself off the rails."¹⁸ The enormous costs required to produce the latest and greatest aircraft designs and the difficulty of constraining that needed funding will significantly limit the number of nations that can acquire such technological marvels—and likely cause many states to concentrate on acquiring "quantity" over "quality."

Despite the exorbitant price tags for fifth-generation aircraft (the Air Force's 187 F-22s cost \$422 million each), manned flight will persist as a cornerstone of America's military air components.¹⁹ The 2012 national defense strategy addresses the Asia-Pacific region, where both China and Russia are perfecting their own fifth-generation fighters.²⁰ Although a conflict with either is improbable, they could sell their designs to potential US adversaries that possess the necessary financial resources. The stealth features of the F-35 and F-22 would prove invaluable against an enemy having Russia's sophisticated "double digit" surface-to-air missiles. Americans cannot consider air superiority a given in future conflicts, as has been the case over Iraq and Afghanistan. The national defense strategy further sanctions the Air Force's plans to have a new stealth bomber built in the coming decades to support the concept of "Air-Sea Battle," but funding for such an aircraft remains uncertain.²¹

In the near term, though, the Air Force desperately needs a new tanker if the United States wishes to retain its status as an airpower nation with global reach. The first of four KC-46 tanker test models rolled out of Boeing's plant in Everett, Washington, this past January after a 12-year ordeal to reach that milestone. By 2027 the Air Force plans to build 179 new tankers that can deliver triple the fuel, three times as many cargo pallets, and twice the passengers as the Eisenhower-era KC-135s that they will replace.²² Obtaining that capability, however, will not come cheaply: the estimated flyaway cost per KC-46 is \$194 million.²³ As with the F-35 and the proposed stealth bomber, funding issues will doubtless be a concern as tanker production intensifies, and such issues could limit the inherent strategic capability that the US Air Force retains in the decades ahead. Bernard Brodie's 1959 observation that "strategy wears a dollar sign" remains an airpower truism a half century later.²⁴

America's political and military leaders face abundant challenges when it comes to developing airpower that will serve the nation's future needs. They must skillfully allocate funds to assure that they have the best technology and the best-trained personnel to fight different kinds of enemies who will wage different types of war. They must be capable of orchestrating the various components of airpower to help achieve the positive and negative objectives that will comprise the war aims in those disparate conflicts. For the United States, airpower is—and will continue to be—a *vital* element of its ability to wage war, *regardless* of the type of war it fights.

Airpower can also be a seductive force, especially for America's political leaders. As Colin Gray writes,

When politicians want to "do something," most especially when they need to be perceived as doing something, and when other nonmilitary and military options either are not available or could only work slowly and uncertainly, it is a great temptation to reach for one's airpower "gun." Airpower will usually be the first preference for US policy makers who feel the need to make a bold, hopefully decisive, statement through action. Alas, too often, it is highly expedient to resort to kinetic airpower as the default op-

tion; it is the expedient tool for those who are impatient or desperate. . . . Because American airpower, necessarily and advantageously, is all but ubiquitously available to lead or support military action, it cannot help but invite and produce addiction.²⁵

The “airpower option” will continue to be available for American leaders in the future, and they will have to fight the urge that it can provide them with a quick, efficient, and bloodless solution to any national security crisis. In that regard, it would serve them well to turn first to their Clausewitz before they reach for a Reaper or an F-22. ◊

Notes

1. Robert B. Strassler, ed., and Richard Crawley, trans., *The Landmark Thucydides: A Comprehensive Guide to the Peloponnesian War* (New York: Free Press, 1996), 43 (1.75.2-3); and Sun Tzu, *The Art of War*, trans. Samuel B. Griffith (New York: Oxford University Press, ca. 1963).
2. Clausewitz asserted that the nature of war consisted of the trinity of passion, chance, and rationality, and that, respectively, those elements mainly affected the populace, the military, and the government of a state. See Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 89.
3. *Ibid.*, 605.
4. William Mitchell, *Winged Defense: The Development and Possibilities of Modern Air Power—Economic and Military* (New York: G. P. Putnam's Sons, 1925), xii.
5. M. J. Armitage and R. A. Mason, *Air Power in the Nuclear Age* (Urbana: University of Illinois Press, 1983), 2.
6. “Air Force Updates Doctrine Documents,” Air Force News Service, 16 November 2011, <http://www.vandenberg.af.mil/news/story.asp?id=123280202>.
7. For more on the notion of positive and negative political objectives and how they influence the application of airpower, see Mark Clodfelter, *The Limits of Air Power: The American Bombing of North Vietnam* (Lincoln: University of Nebraska Press, 2006), ix-xvii, 211–23.
8. Stanford Law School and New York University School of Law, *Living under Drones: Death, Injury, and Trauma to Civilians from US Drone Practices in Pakistan* (Stanford, CA; and New York, NY: International Human Rights and Conflict Resolution Clinic, Stanford Law School; and Global Justice Clinic, New York University School of Law, September 2012), 2, <http://livingunderdrones.org/report/>.
9. *Ibid.*
10. Colin S. Gray, “Understanding Airpower: Bonfire of the Fallacies,” *Strategic Studies Quarterly* 2, no. 4 (Winter 2008): 51, 58–62, 77, <http://www.au.af.mil/au/ssq/2008/Winter/Winter08.pdf>.
11. “Israel Says It Knocked Out Hamas Drone Program,” *CBS News*, 16 November 2012, <http://www.cbsnews.com/news/israel-says-it-knocked-out-hamas-drone-program/>.

12. US Government Accountability Office, *Nonproliferation: Agencies Could Improve Information Sharing and End-Use Monitoring on Unmanned Aerial Vehicle Exports*, GAO-12-536 (Washington, DC: US Government Accountability Office, July 2012), 9–10, <http://www.gao.gov/assets/600/593131.pdf>.
13. *Department of Defense Fiscal Year (FY) 2013 President's Budget Submission: Air Force Justification Book*, vol. 1, *Aircraft Procurement* (Washington, DC: Department of the Air Force, February 2012), 10–11, <http://www.saffm.hq.af.mil/shared/media/document/AFD-120210-115.pdf>.
14. Winslow Wheeler, "Different Planes, Common Problems," *Time*, 6 June 2013, <http://nation.time.com/2013/06/06/different-planes-common-problems/>.
15. Briefing, Lockheed Martin representatives, to students and faculty of National War College, subject: F-35C, 5 February 2014. The representatives claimed that if all projected aircraft were purchased, the cost of a single F-35C would be \$85 million by 2018. That outlay, however, did not include research, development, and tooling—and in some cases, the engine.
16. "Pentagon to Trim Plans for F-35 Jet Order," *Washington Post*, 16 February 2014, http://www.washingtonpost.com/politics/pentagon-to-trim-plans-for-f-35-jet-order/2014/02/16/2310f400-974c-11e3-8461-8a24c7bf0653_story.html.
17. Andrea Shalal, "U.S. Navy to Order 33 Fewer F-35s Than Planned in Next 5 Years—Source," *Reuters*, 4 March 2014, <http://www.reuters.com/article/2014/03/04/us-lockheed-fighter-idUSBREA2306420140304>.
18. David Martin, "Is the F-35 Worth It?," *60 Minutes*, 16 February 2014, <http://www.cbsnews.com/news/f-35-joint-strike-fighter-60-minutes/>.
19. Rajiv Chandrasekaran, "Too Big to Bail," *Washington Post*, 10 March 2013.
20. Department of Defense, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense* (Washington, DC: Department of Defense, January 2012), 2, http://www.defense.gov/news/defense_strategic_guidance.pdf.
21. Ibid., 5.
22. John A. Tirpak, "The Tanker Nears Takeoff," *Air Force Magazine* 97, no. 1 (January 2014): 26–30, <http://www.airforcemag.com/MagazineArchive/Documents/2014/January%202014/0114tanker.pdf>.
23. "Boeing KC-46 Tanker," *Aerospace and Defense Intelligence Report*, 2014, 25 November 2013, <http://www.bga-aeroweb.com/Defense/KC-46-Tanker.html>.
24. Bernard Brodie, *Strategy in the Missile Age* (Princeton, NJ: Princeton University Press, 1959), 358–62.
25. Gray, "Understanding Airpower," 71.



Prof. Mark Clodfelter

Dr. Clodfelter (USAFA; MA, University of Nebraska; PhD, University of North Carolina–Chapel Hill) is a professor of military strategy at the National War College. A former US Air Force officer, he served in radar assignments and teaching posts during a 23-year career. He twice taught history at the US Air Force Academy, ultimately serving as the academy's director of military history, and was part of the initial cadre of instructors at the School of Advanced Air and Space Studies. He also served as commander of the Air Force ROTC detachment at the University of North Carolina. He is the author of *The Limits of Air Power: The American Bombing of North Vietnam* (1989; repr., University of Nebraska Press, 2006); *Beneficial Bombing: The Progressive Foundations of American Air Power, 1917–1945* (University of Nebraska Press, 2010); and numerous articles and book chapters. Dr. Clodfelter is an avid fan of Air Force football, North Carolina basketball, and St. Louis Cardinals baseball.

Let us know what you think! Leave a comment!

Distribution A: Approved for public release; distribution unlimited.

<http://www.airpower.au.af.mil>